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Community Rope Pumps in Nicaragua; A Private Sector Approach

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INTRODUCTION

Clean and sufficient water for hygiene and drinking is one of the basic needs. At times, as in the example of the Nicaraguan rope pump, it proves to be possible to satisfy basic needs through a local designed, produced and marketed product.

What are the water sources in rural Nicaragua?

Figure 2: Water Sources Rural Nicaragua.

On the left hand side you can see how in 1971 only a small percentage of the rural population had access to a piped water system, the column in sky-blue. The green column represents the population who obtains their water from handdug wells and the red column represents rivers, streams or surface water. These sources can be considered as dangerous and are an important chain in the transmission of the diarrheal diseases. Handdug wells are polluted as well but are not that much a chain in the transmission. Upgrading of these wells will improve water quality.
Twenty four years later by '95 there was a percentile increase in coverage through piped water systems but in numbers there were even more people who depended on not hygienic water sources. The question was how this disperse living population could be reached? The piped water system is only an option for a small part of the rural population.
The internationally applied solution has been the community handpump in the centre of a village. You probably all know these traditional handpumps with the up and down moving handle.
The rope pump, the gray column, started at the other side, at the family well with the additional objective to take the people away from the rivers, making water more easily accessible at their homes for washing clothes etc. In a later stage the rope pump took over the place of the traditional handpumps on the community wells too.

By now in the year 2000, the rope pump is covering an increasing percentage of the rural population (about 25%) and the total number of persons who depend on unprotected water sources is decreasing.

HISTORY

Figure 3: 16th Century Chain and Washer Pump

The chain and washer pump was known in China already a thousand years ago and was used in the mining industry in Europe in the 16th Century as can be seen in this engraving.

This technology can be considered as the precursor of the present rope pump. During the seventies and eighties, several intentions were made toward the introduction of the so called rope and washer pump. This rope and washer pump however was a too 'appropriate' technology, only for low depths and not very efficient or durable. Some of this inheritance still chases the present technology.
In Nicaragua in the eighties the first steps were made towards the improvement of the rope pump. PVC pipes and the technology to inject plastics in moulds became available. These were the preconditions to get to the present technology.

TECHNICAL DESCRIPTION

Figure 4: Cross section of rope pump on a handdug well.

Let me give a short technical description of the pumping process and the parts involved. The two most sensitive parts of the pump are the pistons and the guide box.
The guide box, guides the rope with the pistons into the pumping pipe. The pistons push the water through the pumping pipe to the surface in a constant flow. The exact fit of the pistons have to assure that no hydraulic losses occur. The continuos movement of the wheel makes that the overall efficiency of the pump is very high, around 80% of the energy input is delivered in water.

SOCIAL ACCEPTANCE AND THE DEVELOPMENT PROCESS

The rope pump production, marketing and introduction started in Nicaragua through a private enterprise effort . Two ex-fieldworkers of a UNICEF sponsored intervention continued the development of the rope pump in 1990 as they noticed the high social acceptance by the users of the first trial within this project. They captured the social acceptance of the product by the population and gave it continuity . The social acceptance in this stage was based already on its efficiency. The pump had to win it from the rope and bucket, traditionally used to fetch water from the wells, and so it did.
This development process can be considered as an answer, of the private sector, to the demand of the local population. They followed a development process which later on, in the end of the nineties, was defined as the DRA (Demand Responsive Approach). One of the basics of this

approach is that the opinion of the population is taken into account and as such is this a prerequisite for the sustainabilty of an intervention or project.
More general spoken Demand Responsive Approach should be a tool to be taken into account in rural energy policies too.

Figure 5. Annual National Rope Pump Production

In the initial phase the market was opened exclusively through selling to the private sector users. From '93 onwards water and sanitation projects and rural development projects started to use the rope pump in their programs. Some of them used credit schemes and others donated the pumps. By '95 the pump was recognized by the national rural water supply department as a viable alternative, of course an enormous step forward. This result after five years can be considered as rather slow or relatively fast but that depends of course on which side you are on. The truth is that a political opening was created in the national water and sanitation bureaucracy.

In Nicaragua besides the rope pump firm, about 10 workshops can be found producing rope pumps. In this figure an estimate of the development of the rope pump production is presented. The total number of installed pumps is around 20.000, the production is now almost 5000 pumps a year. The rope pump density per capita is around 1 pump per 100 persons in rural area, the highest handpump density in the world, probably.
The high production rate of the last two years is mainly thanks to the inclusion of the pump in the programs of international organisations active in Nicaragua such as UNICEF, WHO, EHP, CARE, Red Cross, Médicins sans Frontières, Save the Children, Foster Parents, etc.

The reason why they do so can be found in the favourable characteristics of the rope pump.

Figure 6. Favourable Characteristics

FAVOURABLE CHARACTERISTICS.

- High social acceptance
    - High efficiency and availability.
    - Easy installation, repair or maintenance. (By users themselves)
- Local production and availability of spare parts.
    - Applicable up to 60 metres depth in handdug wells or boreholes.
    - Low cost, starting at 70 US$ for the family rope pump.

INSTITUTIONAL PARTICIPATION

A certain critical mass is required for a technology to get to a breakthrough and obtain recognition. This number is believed to be around 10.000 and was reached by the rope pump in '98. While the national water and sanitation sector included the rope pump in 1995 as an option, by the year 2000 they recognized it as their national handpump and national standard. Internationally there has always been a very broad interest in this technology, through many letters. However, the international institutional support to this development has been remarkably weak. In '95 the International Water and Sanitation Centre made an independent evaluation. "Their main conclusions was that the rope pump has a great potential to be introduced in other countries. The pump has the potential to be locally manufactured, marketed and installed by the private sector." But that was it. There was no structure or institution who felt responsibility to give followup to these conclusions.
From '96 onwards with the support of the Nicaraguan W & S Institute and the Swiss Development Agency (COSUDE in Nicaragua.), a process of documentation started. This resulted in a series of documents available in English, Spanish and French all directed to the process of international technology transfer.

Figure 7. International Results

INTERNATIONAL RESULTS OF THE TECHNOLOGY TRANSFER

- Honduras: Local production unit: 2000 pumps installed.
- El Salvador: 2000 pumps installed, mainly imported from Nicaragua.
- Ecuador: Several hundreds installed, started around 1993.
- Laos: Several dozen local made and installed. Selection process of workshops in progress.
- Madagascar: Three pumps installed.
- Angola: Three pumps installed or to be installed.
- Zambia: Six pumps. Four installed.
- Ghana: 100 pumps locally produced and installed. (WSP initiative)
- Several smaller initiatives
- ROPE PUMP POLICY WORKSHOP to be held in Nicaragua in May 2001. Convoked by the Hand Pump Technology Network (HTN)

LESSONS LEARNED.

- First of all the already mentioned critical mass. About 10.000 units are needed to get to international recognition. Local social acceptance is not enough to influence at higher levels. In other words it takes time; many good and feasible strategies or technologies will never make it through the bureaucracy. It is not the knowledge but the numbers who count.

- Operation and Maintenance

  As mentioned before, the rope pump has very favourable characteristics related to operation and maintenance. In this case a critical mass is involved too. People have to get used to the technology and this is reached through numbers as well.
  An example; Photovoltaic electrification of an isolated health centre has a small chance to be successful. The same intervention in a village where already several units are installed at family level, has a very good chance to survive.
- Supply Chain.

  Development projects aim to assist and facilitate the creation of an environment of sustainability. Traditionally Rural development projects have concentrated on the implementation, operation and maintenance of new services, but have not adequately considered the provision of goods and services after implementation ***("the Supply Chains***"). At this moment an initiative from the Water and Sanitation Program is going on to document this problem through different case studies around the world. As this is a subject which is very important for energy projects as well, I will explain globally the handpump interventions around the world and the supply chain involved.

Figure 8. Supply Chain

The Traditional Handpumps used in water provision projects are practically all produced in India, where about 3 million pumps are installed. From India to other countries shipping is involved; money transfers etc. An intermediate in the receiving country, to receive the pumps. This can be the State, an NGO or even the private sector. Transport to the province follows where a workshop should install the pump. The same procedure is required for the spare parts later on. All this causes a rather awkward situation for these projects and sustainabilty is not easily guaranteed.
The rope pump supply chain is very short as it is a local product. The supply chain for the spare parts is even smaller as most of it can be found in the local market.
However, there is a good historical reason for the international use of the traditional handpump, as their development started in the sixties based on the handpump technology of that moment, and the rope pump development did not start until in the nineties. What can be learned from this is? 'Once established policies are very difficult to change. Although effectiveness, sustainabilty, the wishes of the users themselves etc. should directly influence in policy decisions, in practice it takes a long time. Take care in this Village Power 2000 as well, many strategies and technologies are discussed, but good solutions still can come out of the field when we really take into account what is wished by the rural population and what is at their reach.

Figure 9.

- The Ghana initiative.

The four actors are:

CWSA	Community Water ans Sanitation Agency (Ghana)
WSP	Water and Sanitation Programme (UNDP/World Bank)
Private Sector	Two workshops in Ghana
Private sector	Rope pump firm in Nicaragua.

Programme:

Preparatory	Reconnaissance mission top W&S sector to Nicaragua
Phase 1.	Technical assistance in Ghana
	Selection workshops
Phase 2	Training technicians in Nicaragua
Phase 3.	Production and installation
	Quality control.
Results:	One hundred pumps installed.
	Technical capacity to produce rope pumps in Ghana.

The perfect success story.
But, to make this really successful, a critical mass is required again. There is an explicit willingness of each of the actors to make it a success. However, the role of the actors is not very clear and we don't have a cookery book yet where it says how to continue. Specifically the relation private sector and development cooperation is part of the discussion. These experiences on private sector participation will probably be very applicable also to other energy related interventions discussed here in Village Power 2000.

Many thanks...